ENVIRONMENT CALIFORNIA

Clean air. Clean water. Open spaces.

Rave Reviews for Solar Homes

A Survey of Homeowners in California

March 2006

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Written by
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Environment California Research & Policy Center

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Executive Summary

As President George W. Bush pronounced America's addiction to oil during his 2006 State-of-the-Union Address, California unveiled the nation's biggest solar power program, the California Solar Initiative. The Initiative sets its sights on building a million solar roofs and a mainstream, self-sufficient solar market in ten years.

With a backdrop of high energy prices, concern over global warming, and a growing desire among Americans to achieve energy independence, the authors of this report set out to inform policy makers, homebuilders and consumers about the potential to integrate solar panels into new homes, making a previously boutique technology as affordable and common-place as insulation and double-paned windows.

With this report, we quantify and qualify the motivations and experiences of homeowners who have recently purchased a new home in which solar panels were added as a standard feature. The report analyzes survey responses from five different developments in northern and southern California to provide some insights into the level of consumer interest in energy efficient home design and into the potential for a mainstream solar home market.

As Figure 1 shows, the ability to save money was the top motivator. Defying stereotypes about the typical solar power enthusiast, the homeowners were nearly five times more motivated by saving money than protecting the environment. This statistic may indicate that solar power has the potential to become a mainstream technology for the budget-conscious American homeowner.

The report recommends policies needed to grow the solar home market, calling for aggressive federal, state and local action to build a robust, self-sufficient and mainstream solar power market within the next ten years.

Ultimately, building solar homes provides a number of benefits to the homebuyer, homebuilder and society at-large.

Everyone benefits from the economies of scale achieved by incorporating solar technologies into large scale developments as well as an enhanced ability to design the home to best incorporate solar technologies. In addition, builders benefit by attracting more interested buyers and, as the survey results show, a highly satisfied customer.

Further, homeowners benefit from being able to roll the cost of a solar system into low-interest mortgages and take advantage of rebates, tax credits and tax deductions to achieve a net cost savings within their first month of ownership.

Figure 1: Top motivations for buying a solar home

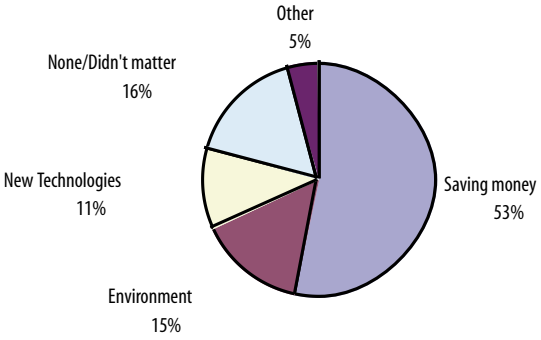
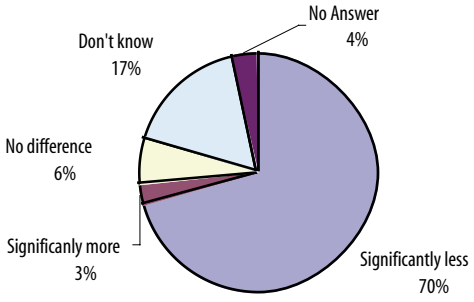


Figure 2: Difference between electric bills in solar homes vs. previous non-solar homes



Lastly, the social benefits of creating a robust solar home market come in the form of greater energy independence, reduced air pollution and, in time, a more stable, affordable energy supply.

Survey Highlights

Analysis of 109 completed surveys reveals the motivation, experience and knowledge of the homeowner living in newly built solar homes. These results are highlighted below:

Solar homeowners were motivated by saving money and reported low energy bills. Specifically:

- 70 percent of the homeowners surveyed say their electric bills are much less than in their previous home;
- 53 percent report their solar home purchase was motivated by saving money;
- Regardless of motivations, the solar system was an important factor for 77% of the home buyers.

Solar homeowners are satisfied customers.

The survey found that:

- 92 percent of respondents would recommend a solar home to a friend, and 93 percent would buy a solar home again;
- 84 percent of solar homeowners believe the solar power system would be a selling feature if they were to sell their home;
- 95 percent of the homeowners think more homes should come with solar power features.
- 86 percent have had no problems with their solar system and 90 percent say their solar system has either no effect or a positive effect on the appearance of their home.

Solar homeowners take additional steps to reduce their consumption of energy. For instance 86 percent of the homeowners say they try to cut their energy consumption, beyond owning a solar system, through energy efficient appliances and lifestyle changes.

Centex Homes is building solar homes in San Ramon, California, Photo Credit: Davis Energy Group

Policy Recommendations

To further the potential for solar homes, federal, state and local governments should:

Design Standards for New Homes. To achieve additional economies of scale and build more sustainable communities, state and local governments should establish minimum solar energy requirements for new construction.

Consumer Rebates. Dozens of states offer some form of consumer rebate program to help buy-down the cost of installing a solar energy system. The nation's largest rebate program was just adopted by the California Public Utilities Commission. Other states should adopt a similar program.

Net Metering. Net metering programs offer consumers the ability to get retail credit for excess electricity generated by their solar system. In return, homeowners provide benefits to the electric grid such as pollution-free peak electricity. These policies are key financial drivers for homeowners considering solar technologies and must be expanded across the country.

Tax Incentives. States should offer solar tax incentives for consumers and the federal government should extend the existing federal

tax credit for ten years to provide greater stability to the solar market nation-wide. States and local governments should also adopt tax-based incentive programs to attract more solar manufacturing closer to local markets.

Solar Rights. All homeowners should have the right to install a solar energy system on their home and not have their roof shaded from the sun, provided that all safety and installation standards are met. State and local governments should ban and discourage zoning ordinances that penalize or discourage solar installations.

Consumer Protections. A rapid growth in the solar market should be accompanied by improved standards and consumer protections such as mandatory solar system inspections and minimum system warranties. States and local governments should improve and expand installer and building inspector training programs and adopt uniform licensing standards.

San Diego homes with solar photovoltaic and solar hot water systems incorporated during construction (Shea Homes)

Survey Results:
Attitude and Experience of Solar Homeowners

During the spring and summer of 2005, one hundred and nine homeowners in five new solar home developments in northern and southern California responded to a twenty-question survey assessing their motivations for purchasing a solar home and their experience owning one. (See Appendix for a copy of the survey). These responses represent approximately twenty percent of the 500 homeowners living in these five developments.

Overall Impression of Solar Homes

The vast majority of the one hundred and nine homeowners surveyed for this report had an overall positive impression of solar power, as shown in Figure 3. These results are in line with polls of average voters that frequently show highly favorably ratings of solar power among the general public. A 2004 poll conducted by Environment California Research & Policy Center, for example, found 87 percent of California voters had a favorable opinion of solar power[1].

Nearly all of the solar homeowners think that more homes should be built like theirs: with solar panels incorporated into them as standard features, as shown in Figure 4.

Figure 3: What is your overall impression of solar power?

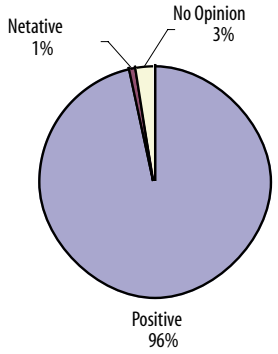
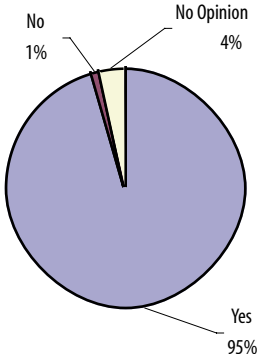


Figure 4: Should more new homes be solar?



Motivations for Buying a Solar Home

The top motivating factor for purchasing a solar home for 53% of the homebuyers was saving money, as shown in Figure 5. Fifteen percent of the buyers were motivated by protecting the environment and eleven percent were motivated by the idea of promoting a new technology.

Interestingly, 16 percent of the homeowners were either unaware that their home had a solar system at the time of purchase, or the solar system didn't factor in to their decision to purchase the home. This is slightly more than the 15 percent who were motivated by protecting the environment in choosing to buy a solar home. These results may indicate the ability for solar power technologies to blend into new home design and become a mainstream technology via the new home market.

Further demonstrating that today's solar homebuyer is not the stereotypical green technology enthusiast, a majority of the homeowners surveyed had little to some knowledge about solar power before purchasing their solar home, as seen in Figure 6.

When asked whether their electric bills were higher or lower when compared with their previous, non-solar home, the answer was overwhelmingly "significantly less". As Figure 7 shows, 7 out of ten respondents reported having significantly lower energy bills. One respondent reported having a bill that was equal to their previous home even though they more than doubled their living space.

When asked to approximate their electric bills, the majority of the respondents provided figures that averaged between $30 and $121 per month, as shown in Figure 8. In contrast, the average California electric bill for a new home is from $130-170 per month[2]. These results indicate that solar home savings could range from 30-75% compared to a non-solar home. Further, nearly a third of the respondents reported having monthly electric bills that were $20 or less.

The range in monthly electric bills is most likely due to different solar system sizes, varying lifestyles, location within California, and the quality of the additional energy efficiency features included in the home in addition to the solar panels.

Regardless of the motivating factor, a vast majority of the homeowners, 77 percent, reported that the solar power system was either very important or somewhat important in their decision to buy their new home, as seen in Figure 9.

Figure 8: Average Solar Home Electric Bill vs. Average Non-Solar Home Electric Bil

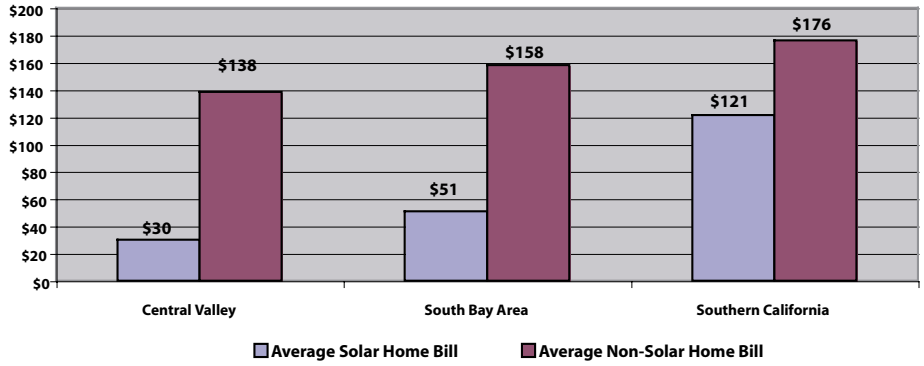


Figure 5: Top motivations for buying a solar home

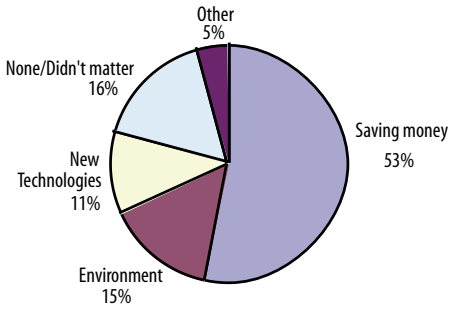


Figure 6: How knowledgeable were you about solar power prior to purchasing your home?

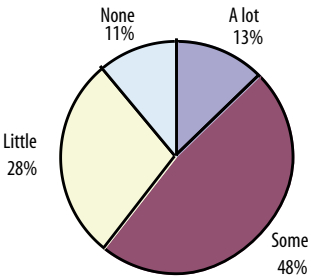
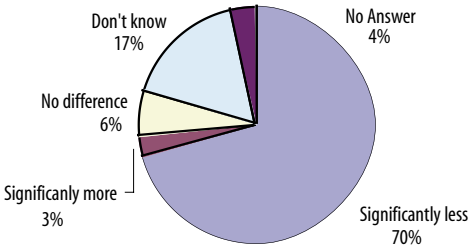


Figure 7: Solar Homes Save Money: Today's electric bills vs prervious non-solar home eletric bills



Solar Homeowners are Satisfied Customers

The survey asked a number of questions to understand whether these solar homeowners were satisfied with their purchase. One measure of satisfaction is personal recommendations to friends and family.

According to the survey, nearly all the homeowners surveyed, 92 percent, would recommend a solar home to a friend, as seen in Figure 10.

Another measure of satisfaction is whether the homeowner would consider purchasing a solar home again. To this question, more than 9 out of ten respondents answered yes, as seen in Figure 11.

Figure 9: Importance of Solar Feature When Buying Home

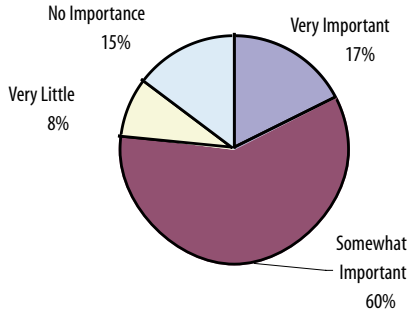


Figure 10: Would you recommend a solar home to a friend?

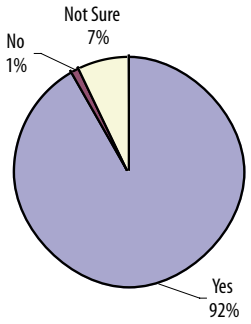


Figure 11: If you were to buy another home, would you prefer a solar powered home again?

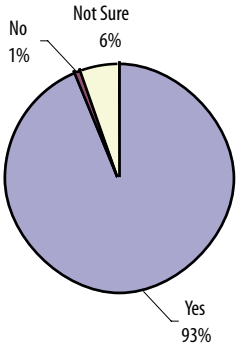
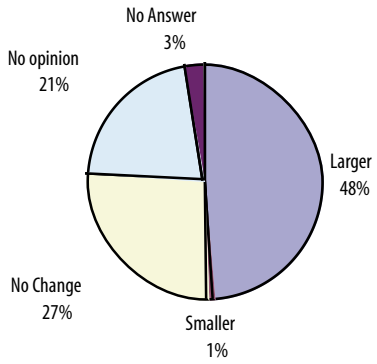


Figure 12: Do you wish the size, and therefore electrical output, of your solar PV system was…



Perhaps the only change the homeowners surveyed would make to their solar home would be to make the solar panels larger so that they could increase energy savings. According to homebuilder materials, most of the homes in the surveyed developments had systems that ranged in size from one to three kilowatts. The average solar system size for a home is 2.5 kilowatts[3]. As seen in Figure 12, nearly half of all respondents wished their solar system was larger while another 27 percent felt that it was appropriately sized.

Directly related to satisfaction is the question of whether or not new solar homeowners have had any problems with their solar systems. To this, the vast majority of respondents reported having no problems with their systems, as seen in Figure 13. Of the 8 percent that reported having problems, 1 complained of difficulty working with their local utility company, and two complained of problems with the inverter/control box. One complained that their solar system simply didn't work.

Solar Power and Perceived Home Resale Value

While "location, location, location" will likely remain the three most important factors in selling real estate, the impact that solar system will have on the resale value of a home is an important issue. If the perception of these 100+ recent homebuyers is any indication, the solar panels will be an added bonus to future resale efforts. As seen in Figure 14, more than 8 out of ten respondents said their solar system would be a selling feature.

Along similar lines, a common concern about solar technologies is how they affect the appearance of a home. According to 82 percent of the respondents living in newly built solar homes, the panels have no affect on the appearance of their home, as seen in Figure 15.

Figure 13: Have you had any problems with your solar power system?

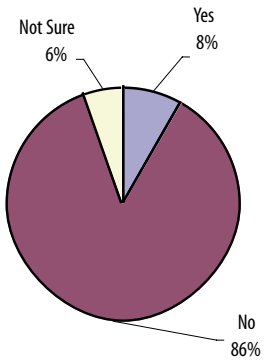


Figure 14: If you were to sell your home, do you think the solar PV system would be a selling feature?

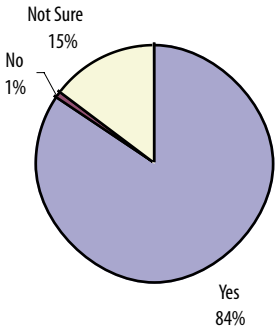
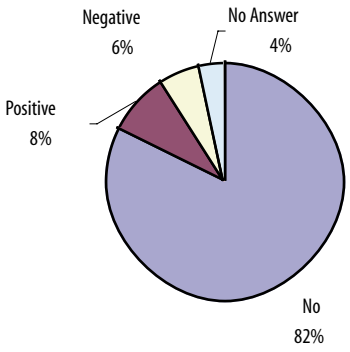


Figure 15: Do the panels affect your home's appearance?



Of the fifteen respondents who reported an effect of some sort, six identified it as a "negative" affect while nine said it had a "positive" affect.

Solar Homeowners are Energy Conscious

According to the survey results, most solar homeowners do not become "energy hogs" using more energy because of some perceived notion that it is "free" now that they have a solar system. Rather, as seen in Figure 16, 86 percent of the respondents reported doing more than simply owning a solar home to reduce their energy demands.

Further, several of the homes had other energy efficiency features incorporated into them as standard features. These measures included on-demand hot water heaters to reduce consumption of natural gas, efficient appliances and lighting features, extra insulation, and double paned windows, as detailed in Figure 17.

Lastly, 68 percent of the surveyed homeowners report having a meter that tracks the total amount of electricity generated by their solar system, as seen in Figure 18.

Figure 16: Do you and your family try to further reduce your energy consumeption?

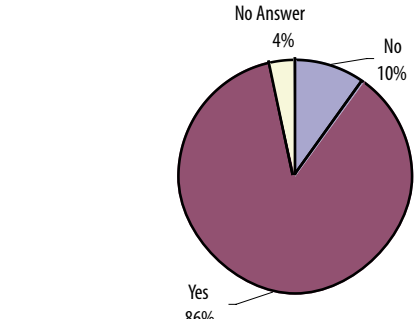


Figure 17: Does your home have any other energy efficiency features such as a solar hot water heater or an on-demand hot water heater?

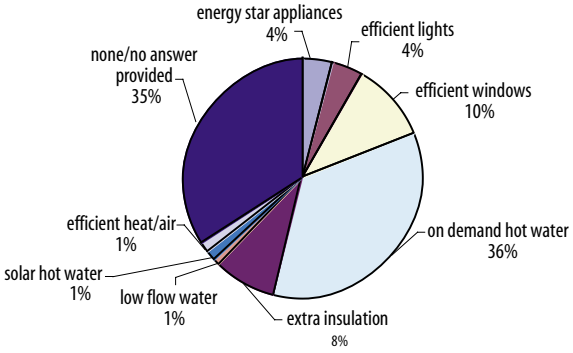
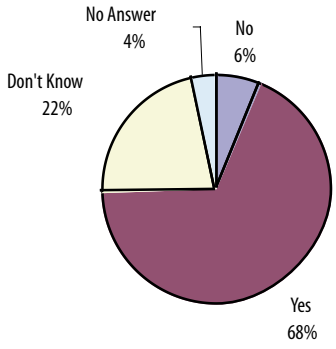


Figure 18: Does your solar system keep track of the total amount of energy used and generated?



The Benefits of Solar Homes

Developing clean, abundant solar power resources can provide numerous benefits to homeowners, homebuilders and society at-large by reducing air pollution, protecting consumers from volatile electricity prices, and reducing the need for expensive upgrades to electric transmission and distribution systems.

Creating a Mainstream Solar Market

With year-round sunshine, a robust housing market, high energy costs and an environmentally-conscious public, making solar power a standard feature of new homes, just like double-paned windows and insulation, is a unique opportunity to literally build a truly clean and independent energy future.

With 200,000 new homes built each year in California alone, the new home market is one of the best opportunities we have to lower the cost of solar power and meet growing energy needs in a sustainable, economically viable manner.[4]

Further, with growing public concern over energy prices and the environment, building solar homes could benefit builders as well, increasing sales and adding to customer satisfaction.

This idea has not been lost on state leaders. Governor Arnold Schwarzenegger, for example, has made it a goal to build at least half of all new homes with solar panels[5]. On January 12, 2006, the California Public Utilities Commission adopted the nation's largest solar power incentive program designed to build a million solar roofs in ten years and create a robust new solar home market.[6]

Other states such as Arizona, New Mexico, New Jersey, Washington, and many more, have also begun to aggressively invest in solar power, adopting policies such a tax incentives for homeowners, consumer rebates, and net metering programs.[7]

As the market for solar power grows in the United States and world-wide, the cost of manufacturing and installing solar systems will decline, removing the greatest barrier to mainstream application of solar power—its high upfront costs[8]. In the meantime, government programs at all levels of government can help lower the cost of solar power, helping build a sustainable energy infrastructure in the near term.[9]

Solar photovoltaic and solar hot water systems being added to new homes in San Diego built by Shea Homes (Photo Credit, NAHBRC)

While dozens of states have programs to support solar power, California's solar market is the third largest in the world and represents around ninety percent of the US market.

As Figure 19 shows, California's demand for solar since adopting the first solar rebate program in 1998 has grown more than 2,800%.[10] Today, there are more than 18,000 homes in California running off of solar power. (Note: Figure 19 shows annual growth in solar installations. Cumulative figures are much higher).

The bulk of these solar homes, however, are the result of retrofit projects as opposed to the more cost-effective method of incorporating the solar panels on a home while it is being built. Approximately 1,000 new homes have been built with solar panels as a standard feature in California, although this number is rising.[12]

Integrating solar systems into new home construction is an effective way to surmount many of the hurdles to greater solar power penetration.

First, by including solar in initial plans, builders can choose home and site layouts that can take maximum advantage of the solar resource – for example, by preserving southern exposure or by integrating solar into plans for high energy efficiency homes.

Second, including solar technologies in initial plans can reduce the cost of the system in a variety of ways. For example, builders may gain experience with solar installations and/or be able to achieve discounts on bulk orders of solar systems, while the building's electrical systems can be specifically designed to take advantage of solar power.

Of course, not all homes, new or existing, are equally suitable for solar power. For solar homes to operate most effectively, the solar system needs to be in the sunlight for most or all of the day, not under trees or other sources of shade. Since the sun is always in the southern half of the sky in the North America, south-facing roofs are generally preferable, though east or west-facing roofs may also work for certain homes. Solar panels can also lie flat on a roof, but are optimized if they are tilted at an angle toward the south, increasing the amount of time that the full panel is exposed to the sun's rays.

Helping Stabilize Electric Grid

Ultimately, policies that encourage the development of "solar homes" can best take advantage of the nation's abundant solar energy resources providing relief to stressed and aging electric grids.

Table 1: Economic Benefits of 2.5 kW DC Solar PV System on a New Home with $2,800/kW Buydown Grant

(year 1)	Net Monthly Loan Payment (after tax)	Year 1 Savings	Cumulative Cash Flow (30 yrs.)	Monthly Electric Bill Savings	Net Present Value
San Jose	$57	$44	$152	$7,662	$2,722
Bakersfield	$53	$44	$100	$5,718	$1,989
San Diego	$54	$44	$122	$6,534	$2,296
Murrieta	$47	$44	$32	$3,144	$1,018
Fontana	$46	$44	$20	$2,702	$851
Rancho Cucamonga	$46	$44	$20	$2,702	$851
Irvine	$49	$44	$58	$4,116	$1,384
Long Beach	$49	$44	$58	$4,116	$1,384
Chula Vista	$49	$44	$52	$3,910	$1,307

A 2003 study of new homes built with solar panels as a standard feature in San Diego, for example, concluded that equipping 1,000 homes with solar panels could reduce electricity demand by over half a megawatt on hot summer afternoons when the local electric grid is stressed from high demand.[13]

Further, this same study found that solar hot water systems incorporated into the homes during construction significantly reduced the demand for natural gas supplied by the same local utility company.[14]

Saving Homeowners Money

A recent report by Environment California Research & Policy Center shows that with a buy-down grant of $2,800 per kilowatt of installed solar capacity, a solar homeowner could be expected to generate modest economic benefits.[15]

Based on outputs from an economic model developed for the National Renewable Energy Laboratory, the installation of a 2.5 kW DC (2.14 kW AC) solar PV system priced at $6.00 per Watt can be expected to generate net economic benefits for new homebuyers in nine of California's fastest-growing municipalities with a buydown grant of $2,800 per kW. (See Table 1.)

California's Solar Home Developments

A small but growing number of homebuilders are realizing the many benefits, economic, environmental and otherwise, of incorporating solar panels into new housing developments. Over the past five years, approximately ten companies have incorporated solar panels into twelve different housing developments throughout northern and southern California. Other states, such as Nevada, have also seen some developers design new housing projects with solar. In total, California has approximately 1,200 homes in which solar panels have been included as a standard feature. According to some studies, another 1,000 new homes are in the process of being built with solar panels in California (See endnote 12). Below is a map showing completed solar home developments in California.

Builder: **Premier Homes**
Development: **Premier Oaks**
Location: **Roseville**
No. Solar Homes: **49**

Builder: **Treasure Homes**
Development: **Fallen Leaf**
Location: **Natomas**
No. Solar Homes: **32**

Builder: **Premier Homes**
Development: **Premier Gardens**
Location: **Sacramento**
No. Solar Homes: **99**

Builder: **Morrison Homes**
Development: **Lakeside**
Location: **Elk Grove**
No. Solar Homes: **12 out of 1 20**

Premier Homes: Sacramento's first all solar housing project.

(Photo credit: Premier Homes)

Builder: **Clarum Homes**
Development: **Hamilton Park**
Location: **Menlo Park**
No. Solar Homes: **47**

Builder: **Clarum Homes**
Development: **Cherry Blossom**
Location: **Watsonville**
No. Solar Homes: **31**

Builder: **Clarum Homes**
Development: **Shorebreeze**
Location: **Palo Alto**
No. Solar Homes: **39**

Builder: **Clarum Homes**
Development: **Vista Montana**
Location: **Watsonville**
No. Solar Homes: **257**

Builder: **Castle & Cooke**
Development: **Windermere Homes**
Location: **Bakersfield**
No. Solar Homes: **239**

Clarum Homes's all-solar development in northern California.

(Photo Credit: Clarum Homes)

Builder: **Shea, Pardee, Richman, K. Hovanian**
Development: **Ladera Ranch**
Location: **Orange County**
No. Solar Homes: **375**

Builder: **KD Homes**
Development: **The Trails**
Location: **San Diego**
No. Solar Homes: **6 Apartments**

Builder: **Pardee**
Development: **Soleil**
Location: **San Diego**
No. Solar Homes: **30**

Policy Recommendations

Policies targeted at increasing demand for solar power installations are the best way to simultaneously increase solar generating capacity and drive down the cost of solar technologies in the long-term. This will increase the amount of electricity generated from clean, distributed sources, build the strength of the solar industry, and pave the way for further growth in generation from clean solar power in the decades ahead.

California's Governor Schwarzenegger set a goal of 3,000 MWp of total new solar PV capacity and half of all new homes built with solar power over the next 10 years, and meeting that goal will require bringing down the cost. The strongest policies to achieve this goal combine market-based mechanisms with design standards for new construction.

Establish Solar Requirements for New Construction

To achieve economies of scale and build more sustainable communities, state and local governments should not just set goals but rather establish minimum solar energy requirements for new construction. At the very minimum, solar energy systems, including photovoltaic and hot water, should be required to be a standard option on all new homes, just like marble counter tops where all new buyers are given the option and information needed to add a solar energy system to their new home. States should also consider policies that make solar energy technologies standard features of new homes, as it was in the five developments surveyed for this report. Such policies will maximize ratepayer and taxpayer investments by driving prices down and increasing installation efficiencies.

Dedicate Funds for a Solar Incentive Program

Dozens of states already offer some form of consumer rebate program to help buy-down the cost of installing a solar energy system. The nation's largest rebate program was just adopted by the California Public Utilities Commission on January 12, 2006. This program, called the California Solar Initiative, created a combined $3.2 billion solar fund, paid through a surcharge on electric bills, to build a self-sustaining solar market in ten years. To accomplish the goal in California, this program must be fully implemented to give the solar industry a secure dedicated fund to attract investment and lower prices over time. Other states should adopt similar programs to ensure solar power becomes a self-sufficient and affordable technology in the next decade.

Net metering

Net metering programs offer consumers the ability to get a retail credit for any excess electricity generated by their solar system on their monthly electric bill. This program is a key financial driver for growing the nation's solar home market as it essentially allows consumers to forego the need to buy an expensive battery and instead use the electric grid as a storage device. In return, solar homeowners provide critical benefits to the electric grid, providing peak-time electricity and helping to stabilize the grid. Forty states have some form of a net metering program for solar energy systems upon which to expand to maximize this financial incentive (AZ, AR, CA, CO, CT, DE, FL, GA, HI, ID, IL, IN, IA, KY, LA, ME, MD, MA, MI, MN, MO, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, RI, TX, UT, VT, VI, WA, WI, WY).[16] For example, California currently has a statewide net metering program that is capped at 0.5% of a utility's total aggregated electrical load.[17] This means that once the total amount of solar energy exceeds this 0.5% cap, the utility company is no longer obligated to offer and sign new net metering contracts.

To meet the state's new goal of building 3,000 megawatts of solar power on a million roofs throughout the state, the net metering cap will need to be lifted to at least 5% and ultimately should be eliminated altogether. Other states should do the same. Further, moving beyond net metering, states should look to adopting a feed-in tariff program for large scale installations. Feed-in-tariff programs have been established in Germany and also the state of Washington. Instead of giving an upfront consumer rebate and a credit on monthly electric bills for excess electricity, feed-in-tariff programs allow solar system owners of any size to receive a guaranteed price for all the electricity generated by the solar system. The price is then set at a level that provides a financial incentive for consumers to invest in the solar system.

Encourage Solar Through Utility Billing Practices

Other important policies can help ensure that homeowners who install solar systems maximize the return on their investment. One such policy is to make time-of-use billing an option for all electric power customers.

Time-of-use billing is simply a structure in which the price of electricity varies by day and by season, with higher prices charged during peak hours, usually hot summer afternoons. With this form of billing, coupled with net metering, the credit given to a solar system owner by day is higher than the electricity consumed by night when the solar system is not generating electricity. Time-of-use billing allows a net metered customer to receive a credit for their pollution-free, peak electricity power that is closer to its actual worth. In other words, electricity supplied during peak hours is worth more than electricity supplied during low-demand hours, such as midnight, and therefore should be duly compensated.

Continue Tax Incentives

States should offer tax incentives for solar technologies, including solar photovoltaics and solar hot water systems, and the federal government should extend the existing federal tax credit for at least five years to provide greater stability to the solar market nationwide. States and local governments should also adopt tax-based incentive programs to attract more manufacturing of the various components of a solar system and to discourage anti-solar zoning and local ordinances that are designed to discourage solar energy systems. Several states already have some form of tax incentives including, AZ, CA, CT, FL, HI, ID, IL, ID, IA, KS, LA, MD, MA, MI, MN, MT, NV, NH, NJ, NM, NY, NC, ND, OH, OR, RI, SD, TX, UT, VT, VA, WA, WI, WY.[18]

Consumer protections

A rapid growth in the American solar market should be accompanied by improved standards and consumer protections such as mandatory system inspections and minimum system warranties. States and local governments should improve installer and building inspector training and licensing standards.

Research and Development

Governments should also continue R&D programs that support improvements in the various photovoltaic conversion technologies, inverter engineering, factory production, and other technical aspects that can develop knowledge and then disseminate it through the industry to help companies make better decisions about how to reduce costs as they meet increasing demand.

Solar Rights for Homeowners

All homeowners should have the right to install a solar energy system on their home as well as have reasonable access to sunshine

provided that all safety and installation standards are met. Many states have "solar rights" or "solar access" laws prohibiting local zoning or neighborhood ordinances from denying private property access to sunshine or from prohibiting the installation of solar systems on private rooftops. All of these programs could be improved upon at the state and local level.

Conclusion

Growing the new solar home market, as well as the existing home and commercial markets, will create the demand needed to drive down prices in the long term while providing a more stable, pollution free energy resource. Doing so will also benefit ratepayers by reducing peak demand, reducing the need for polluting power plants and reducing the need for expensive upgrades to transmission and distribution systems. Building a mainstream, self-sufficient solar market will also decrease the nation's reliance on fossil fuels while bringing cleaner air and more local jobs. Ultimately, building solar homes can benefit the next generation of new California homeowners by providing a stable source of pollution free and local energy.

Appendix:
Solar Home Survey

Survey results detailed in this report were collected through a combination of direct mail and door-to-door canvassing during the spring and summer of 2005 with the survey found on the following two pages.

The completed survey's came from the following developments:

Builder	Development	Location	Total Number of Homes in Development	Number of Survey Returns from Development
Clarum Homes	Shorebreeze	East Palo Alto	39	8
Clarum Homes	Vista Montana	Watsonville	259	21
Clarum Homes	Cherry Blossom	Freedom	31	6
Premier Homes	Premier Gardens	Sacramento	99	34
Shea Homes	Ladera Ranch	Orange County	87	40
Total			515	109

SOLAR HOME SURVEY

Thank you for taking the time to complete our Solar Home Survey. We are conducting this survey to better assess the quality, convenience, and benefits of solar homes in California. Your experience with a solar photovoltaic (PV) system is extremely valuable to our research assessing the value and quality of solar homes. We would greatly appreciate it if you would complete this 20-question survey and return this form to us by either fax or mail (see contact information on last page). All information will be kept confidential.

Contact Information (optional):
Please Print
Your Name: _____

Address: _____ City: _____ Zip: _____

Phone : _____ Email: _____

Your Solar Home

1) What was your top motivation in purchasing a solar powered home?

- ☐ Saving money/Lowering electric bill
- ☐ Lessening my environmental impact
- ☐ Promoting green technologies/Interest in solar technology of solar power
- ☐ None of the above. I didn't know my home was solar powered until after I purchased it or it didn't matter to me.
- ☐ Other (please specify) _____

_____

_____

_____

2) How important was the solar PV system in your decision to buy your home?

- ☐ Very Important: major reason for choosing home
- ☐ Somewhat Important: an interesting bonus
- ☐ Very Little Importance
- ☐ No Importance: little to no impact on decision

3) Would you recommend a solar home to a friend?

☐ Yes ☐ No ☐ Not sure

4) If you were to buy another home, would you prefer a solar powered home again?

☐ Yes ☐ No ☐ Not sure

5) If you were to sell your home, do you think the solar PV system would be a selling feature?

☐ Yes ☐ No ☐ Not sure

6) What is your overall impression of solar power?

☐ Positive ☐ Negative ☐ No opinion

7) Do you think more homes should be solar?

☐ Yes ☐ No ☐ No opinion

8) How knowledgeable were you about solar power prior to purchasing your home?

☐ Very ☐ Somewhat
☐ Barely ☐ None

9) What kind of solar power system do you have?

- ☐ Modular – mounted to roof
- ☐ Building Integrated – part of roofing material
- ☐ On top of a trellis/Other structure
- ☐ Other (please describe) _____
- ☐ I don't know

10) Have you had any problems with your solar power system?

☐ Yes ☐ No ☐ Not sure

If yes, please describe briefly: _____

_____

_____

_____

Please continue on back

11) Do the panels affect your home's appearance?

- ☐ No, the system is not noticeable
- ☐ Yes, the system affects my home's appearance
  If yes, would you say the effect is positive or negative? _____

12) What is the size of the solar photovoltaic (PV) system on your home (in kilowatts, kW)?

- ☐ < 1 kW
- ☐ From 1 to 3 kW
- ☐ From 3 to 5 kW
- ☐ > 5 kW
- ☐ Don't know

13) Do you wish the size, and therefore electrical output, of your solar PV system was…

- ☐ Larger
- ☐ Smaller
- ☐ No change desired. It is perfect as is.
- ☐ No opinion

14) Does your solar system keep track of the total amount of energy used and generated? (This is usually a digital display on a panel inside your home/garage)

- ☐ No, there is no record
- ☐ Yes. How much has it generated (kWh)?

  _____

  _____
- ☐ I don't know

15) Does your home have any other energy efficiency features such as a solar hot water heater or an on-demand hot water heater? If yes, please describe:

_____

_____

_____

_____

16) What is your average monthly electric bill?

$ _____ ☐ I don't know

17) How do your electric bills today compare with your bills at previous non-solar homes?

- ☐ My electric bills today are significantly less than when I lived in a non-solar home
- ☐ My electric bills today are significantly more than when I lived in a non-solar home
- ☐ I don't notice any difference. My electric bills are the same as when I lived in a non-solar home.
- ☐ I don't know/No means of comparing.

18) Do you and your family try to further reduce your energy consumption?

☐ No ☐ Yes

If yes, please check all those that apply to you:

- ☐ Buy efficient products, i.e. compact fluorescent bulbs, Energy Star appliances, etc.
- ☐ Lifestyle controls, i.e. temperature control, turning off lights when not in use, etc).
- ☐ Other (please describe): _____

  _____

  _____

  _____

19) How frequently would you say you and your family consider/think about your solar system?

- ☐ Every day
- ☐ Once a month
- ☐ Once a year
- ☐ Never

20) Would you be willing to be involved further in our campaign to promote solar power in California?

☐ Yes/Maybe* ☐ No

*If yes or maybe, please be sure to provide your contact information on the top of this form so that we can contact you.

Thank You!

Please return by fax or mail to:

Solar Home Survey, 1107 9th St, Suite 601 Sacramento, CA 95814, 916-448-4560 (fax)
For more information: Bernadette Del Chiaro, Environment California Research & Policy Center, (916) 446-8062 x 103 - bernadette@environmentcalifornia.org - www.environmentcalifornia.org

End Notes

[1] Cheryl Katz, Baldassare Associates, "Public Attitudes and Support for Solar Power A Survey of Likely Voters in California Conducted for Environment California Research & Policy Center" June 2004.
[2] According to the California Energy Commission, the average California home consumes 550 kilowatt hours of electricity per month where as the average new California home, while more efficient is larger in size and filled with more electronic appliances and gadgets, and therefore consumes an average of 770 kilowatt hours per month. According to the California Energy Commission, the average electric rate for California homes is approximately thirteen cents per kilowatt hour.
[3] The listed effect of the solar system on the home's appearance was "big". This same respondent also expressed a desire to have an even larger system later on in the survey.
[4] California Construction Review Private Building Construction (Construction Industry Research Board, Burbank, CA.), May 27, 2004.
[5] Press Release, Californians for Arnold Schwarzenegger, Schwarzenegger Details Specifics of Environmental Action Plan (Sept. 21, 2003) at http://www.schwarzenegger.com/news.asp?id=1287.
[6] Press Release, CPUC, PUC Creates Groundbreaking Solar Energy Program (Jan. 12, 2006).
[7] See Database for State Incentives for Renewable Energy for complete list of state by state incentives for solar power, available at http://dsireusa.org/.
[8] Dave Algoso, Mary, Braun & Bernadette Del Chiaro, Environment California Research & Policy Center, Bringing Solar to Scale: California's Opportunity to Create a Thriving, Self-Sustaining Residential Solar Market (April 2005).
[9] Ibid.
[10] Based on CEC Emerging Renewables Program, Data Showing Approved and Completed Systems Pre-2005, at http://www.energy.ca.gov/renewables/emerging_renewables/2005-11-02_pre_1_1_2005_pc.xls; and post 2005 at http://www.energy.ca.gov/renewables/emerging_renewables/2005-12-13-post_1_1_2005_update.xls.
[11] Ibid.
[12] There currently is no official count of the number of homes built with solar panels in California. The 1,000 number reported here comes from the author's survey of builders and the media regarding built solar home developments. Other reports indicate there may be as many as 1,000 more homes that are in the process of being built or part of a promise from a developer interested in incorporating solar panels. See Galen Barbose, Ryan Wiser and Mark Bolinger, "Supporting Photovoltaics in Market-Rate Residential New Construction: A Summary of Programmatic Experience to Date and Lessons Learned" (Feb. 2006, LBNL-59299).
[13] Moore, Mike. "Final Report for Field Evaluation of PATH Technologies", Partnership for Advancing Technology in Housing, October 2003, pg. 1.
[14] Ibid, pg. 1.
[15] Bernadette Del Chiaro, Tony Dutzik & Jasmine Vasavada, Environment California Research & Policy Center, "The Economics of Solar Homes in California: How Residential Photovoltaic Incentives Can Payoff for Homeowners and the Public" (Dec. 2004).
[16] See Database for State Incentives for Renewable Energy for complete list of state by state incentives for solar power, available at http://dsireusa.org/.
[17] S.B. 656, 1996 Leg., 1995-96 Sess. (Cal. 1995), available at http://www.leginfo.ca.gov/cgi-bin/postquery?bill_number=sb_656&sess=9596&house=B&author=senator_alquist_(coauthor:_assembly_member_takasugi) (last visited Feb. 21, 2006).
[18] See Database for State Incentives for Renewable Energy for complete list of state by state incentives for solar power, available at http://dsireusa.org/.